

Claims

We claim:

1 1. A disk storage medium comprising:
2 a disk substrate;
3 a storage area provided on said disk substrate for recording
4 data; and
5 a circumferential landing zone provided on an area of said
6 disk substrate other than said storage area, the landing zone
7 being used for landing a head/slider which has air bearing
8 surfaces for floating a read-write head which reads out data from
9 said storage area or writes data to said storage area; and
10 said landing zone has a circumferential free zone which
11 faces a minimum fly height area of said head/slider which is
12 lowest in fly height among said air bearing surfaces and also has
13 a circumferential bump zone adjacent to said free zone;
14 said bump zone is formed with bumps protruding from the
15 surface of said disk substrate; and
16 said free zone has no bumps.

1 2. The disk storage medium of Claim 1, wherein said bumps
2 comprise laser bumps formed by irradiating laser light on the
3 said disk substrate.

1 3. The disk storage medium of Claim 1, wherein said bump
2 zone is provided on both the inner circumferential side and the
3 outer circumferential side of said free zone.

1 4. The disk storage medium of Claim 2, wherein said bump
2 zone is provided on both the inner circumferential side and the
3 outer circumferential side of said free zone.

1 5. A disk drive comprising:
2 a head/slider having an air bearing surface for floating a
3 head/slider over a rotating disk;
4 the disk having a disk substrate, a storage medium on at
5 least a portion of a surface of the disk, the storage medium
6 having a storage area for recording data, the disk having a
7 circumferential landing zone on an area of the disk other than
8 said storage area, the circumferential landing zone being
9 partially textured;
10 the landing zone having a texture free zone which faces a
11 minimum fly height area of the air bearing surface of the
12 head/slider when the head/slider is landing and also having a
13 circumferential bump zone adjacent to said free zone, the bump
14 zone being formed with bumps protruding from the surface of said
15 disk, the free zone having no bumps; and
16 a landing position control unit for moving the head/slider
17 so that the minimum fly height area of said head/slider is
18 positioned over the free zone of said disk storage medium when
19 landing said head/slider.

1 6. The disk drive of claim 5 wherein the head/slider has
2 at least an inner and an outer rail with the inner rail being
3 closest to a center of the disk and wherein the minimum fly
4 height area is on the inner rail.

1 7. The disk drive of claim 5 wherein the bumps have a
2 height above the surface such that the minimum fly height area of
3 the head/slider does not touch the surface of the disk during
4 landing.

1 8. The disk drive of claim 5 wherein the bumps have a
2 height above the surface equal to or greater than a difference
3 $\Delta H1$ between a fly height of a rear end portion of a side rail
4 and a fly height of a rear end portion of the center rail.

1 9. A method of operating a disk drive comprising the steps

2 of:

3 rotating a disk under a head/slider having an air bearing

4 surface and flying the head/slider over the disk;

5 positioning the head/slider over a area on the disk which

6 includes a textured area and an untextured area with the

7 untextured area being under an area on the air bearing surface

8 having a lowest flying height;

9 reducing a rotation rate of the disk to allow a portion of

10 the air bearing surface not having the lowest flying height to

11 contact the textured area of the landing zone first; and

12 stopping the disk.

1 10. The method of claim 9 wherein the head/slider has at

2 least an inner and an outer rail with the inner rail being

3 closest to a center of the disk and wherein the minimum fly

4 height area is on the inner rail.

1 11. The method of claim 9 wherein the textured area has a
2 plurality of bumps protruding above a surface of the disk, the
3 bumps having a height above the surface such that the minimum fly
4 height area of the head/slider does not touch the surface of the
5 disk during landing.

Broad a surface does not have to be the surface facing the slider.

1 12. The method of claim 11 wherein the bumps have a height
2 above the surface equal to or greater than a difference $\Delta H1$
3 between a fly height of a rear end portion of a side rail and a
4 fly height of a rear end portion of the center rail.